Claims

WHAT IS CLAIMED IS:

1. A method comprising:

computing a minimum cost path in a stereo disparity model between a scan line of a first image and a corresponding scan line of a second image of a stereo image pair, the stereo disparity model distinguishing between non-fronto-parallel matched pixels in each scan line and occluded pixels in each scan line.

2. The method of claim 1 wherein the computing operation comprises:

computing matching costs for each pixel of each scan line pair.

3. The method of claim 1 wherein the computing operation comprises:

computing matching costs for each pixel of each scan line pair using a windowed matching cost function.

4. The method of claim 1 wherein the computing operation comprises:

altering the matching costs for at least one pixel pair based on whether the pixel pair is determined to be associated with a non-fronto-parallel surface or an occlusion.

5. The method of claim 1 wherein the computing operation comprises:

determining a minimum cost path in the stereo disparity model.

6. The method of claim 1 wherein the computing operation comprises:

applying a cost penalty to a move from an occluded pixel pair to a matched pixel pair.

7. The method of claim 1 wherein the computing operation comprises:

applying a cost penalty to a move from a matched pixel pair to an occluded pixel pair.

8. The method of claim 1 wherein the computing operation comprises:

applying a cost penalty to a move from an occluded pixel pair to another occluded pixel pair.

9. The method of claim 1 wherein the computing operation comprises:

applying a first cost penalty to a move from an occluded pixel pair to another occluded pixel pair; and

applying a second cost penalty to a move from a matched pixel pair to an occluded pixel pair, the first cost penalty being different than the second cost penalty.

10. The method of claim 1 wherein the computing operation comprises:

applying a first cost penalty to a move from an occluded pixel pair to another occluded pixel pair; and

applying a second cost penalty to a move from a matched pixel pair to an occluded pixel pair, the first cost penalty being less than the second cost penalty.

11. The method of claim 1 further comprising:

computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, a disparity of the corresponding pixels being characterized by a minimum cost path of the stereo disparity model.

12. The method of claim 1 further comprising:

computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, wherein corresponding pixels that are matched are projected as a virtual pixel onto the cyclopean virtual image scan line.

13. The method of claim 1 further comprising:

computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, wherein corresponding pixels that are averaged to determined a value of a resulting virtual pixel on the cyclopean virtual image scan line.

14. The method of claim 1 further comprising:

computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, wherein a non-occluded pixel of an occluded pair of corresponding pixels is projected as a virtual pixel onto the cyclopean virtual image scan line from a background disparity in the stereo disparity model.

15. The method of claim 1 further comprising:

computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, wherein a value of a non-occluded pixel of an occluded pair of corresponding pixels is selected as a value of a resulting virtual pixel on the cyclopean virtual image scan line.

16. A computer program product encoding a computer program for executing on a computer system a computer process, the computer process comprising:

computing a minimum cost path in a stereo disparity model between a scan line of a first image and a corresponding scan line of a second image of a stereo image pair, the stereo disparity model distinguishing between non-fronto-parallel matched pixels in each scan line and occluded pixels in each scan line.

17. The computer program product of claim 16 wherein the computing operation comprises:

computing matching costs for each pixel of each scan line pair.

18. The computer program product of claim 16 wherein the computing operation comprises:

computing matching costs for each pixel of each scan line pair using a windowed matching cost function.

19. The computer program product of claim 16 wherein the computing operation comprises:

altering the matching costs for at least one pixel pair based on whether the pixel pair is determined to be associated with a non-fronto-parallel surface or an occlusion.

20. The computer program product of claim 16 wherein the computing operation comprises:

determining a minimum cost path in the stereo disparity model.

21. The computer program product of claim 16 wherein the computing operation comprises:

applying a cost penalty to a move from an occluded pixel pair to a matched pixel pair.

22. The computer program product of claim 16 wherein the computing operation comprises:

applying a cost penalty to a move from a matched pixel pair to an occluded pixel pair.

23. The computer program product of claim 16 wherein the computing operation comprises:

applying a cost penalty to a move from an occluded pixel pair to another occluded pixel pair.

24. The computer program product of claim 16 wherein the computing operation comprises:

applying a first cost penalty to a move from an occluded pixel pair to another occluded pixel pair; and

applying a second cost penalty to a move from a matched pixel pair to an occluded pixel pair, the first cost penalty being different than the second cost penalty.

25. The computer program product of claim 16 wherein the computing operation comprises:

applying a first cost penalty to a move from an occluded pixel pair to another occluded pixel pair; and

applying a second cost penalty to a move from a matched pixel pair to an occluded pixel pair, the first cost penalty being less than the second cost penalty.

26. The computer program product of claim 16 wherein the computer process further comprises:

computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, a disparity of the corresponding pixels being characterized by a minimum cost path of the stereo disparity model.

27. The computer program product of claim 16 wherein the computer process further comprises:

computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, wherein corresponding pixels that are matched are projected as a virtual pixel onto the cyclopean virtual image scan line.

28. The computer program product of claim 16 wherein the computer process further comprises:

computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, wherein corresponding pixels that are averaged to determined a value of a resulting virtual pixel on the cyclopean virtual image scan line.

29. The computer program product of claim 16 wherein the computer process further comprises:

computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, wherein a non-occluded pixel of an occluded pair of corresponding pixels is projected as a virtual pixel onto the cyclopean virtual image scan line from a background disparity in the stereo disparity model.

30. The computer program product of claim 16 wherein the computer process further comprises:

computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, wherein a value of a non-occluded pixel of an occluded pair of corresponding pixels is selected as a value of a resulting virtual pixel on the cyclopean virtual image scan line.

31. A system comprising:

a dynamic programming module computing a minimum cost path in a stereo disparity model between a scan line of a first image and a corresponding scan line of a second image of a stereo image pair, the stereo disparity model distinguishing between non-fronto-parallel matched pixels in each scan line and occluded pixels in each scan line.

32. The system of claim 31 wherein the dynamic programming module computes matching costs for each pixel of each scan line pair.

33. The system of claim 31 wherein the dynamic programming module computes matching costs for each pixel of each scan line pair using a windowed matching cost function.

34. The system of claim 31 wherein the dynamic programming module alters the matching costs for at least one pixel pair based on whether the pixel pair is determined to be associated with a non-fronto-parallel surface or an occlusion.

35. The system of claim 31 wherein the dynamic programming module determines a minimum cost path in the stereo disparity model.

36. The system of claim 31 wherein the dynamic programming module applies a cost penalty to a move from an occluded pixel pair to a matched pixel pair.

37. The system of claim 31 wherein the dynamic programming module applies a cost penalty to a move from a matched pixel pair to an occluded pixel pair.

38. The system of claim 31 wherein the dynamic programming module applies a cost penalty to a move from an occluded pixel pair to another occluded pixel pair.

39. The system of claim 31 wherein the dynamic programming module applies a first cost penalty to a move from an occluded pixel pair to another occluded pixel pair and a second cost penalty to a move from a matched pixel pair to an occluded pixel pair, the first cost penalty being different than the second cost penalty.

40. The system of claim 31 wherein the dynamic programming module applies a first cost penalty to a move from an occluded pixel pair to another occluded pixel pair and a second cost penalty to a move from a matched pixel pair to an occluded pixel pair, the first cost penalty being less than the second cost penalty.

41. The system of claim 31 further comprising:

a cyclopean virtual image generator computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, a disparity of the corresponding pixels being characterized by a minimum cost path of the stereo disparity model.

42. The system of claim 31 further comprising:

a cyclopean virtual image generator computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, wherein corresponding pixels that are matched are projected as a virtual pixel onto the cyclopean virtual image scan line.

43. The system of claim 31 further comprising:

a cyclopean virtual image generator computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, wherein corresponding pixels that are averaged to determined a value of a resulting virtual pixel on the cyclopean virtual image scan line.

44. The system of claim 31 further comprising:

a cyclopean virtual image generator computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, wherein a non-occluded pixel of an occluded pair of corresponding pixels is projected as a virtual pixel onto the cyclopean virtual image scan line from a background disparity in the stereo disparity model.

45. The system of claim 31 further comprising:

a cyclopean virtual image generator computing a cyclopean virtual image scan line based on corresponding pixels of the scan lines of the first and second images, wherein a value of a non-occluded pixel of an occluded pair of corresponding pixels is selected as a value of a resulting virtual pixel on the cyclopean virtual image scan line.